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E NEW ESCORT

LES EUROPE

SHOW PREVIEW

GULANI—GENIUS OR MADMAN?

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AUTOMOTIVE INDUSTRIES

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Trying to define the elusive 'Q Word'.

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Defining quality is no easy task for today's automakers, but it ranks as one of the most important factors in the retail buy. Find out how automotive quality bigwigs define the 'Q' word on page 36.

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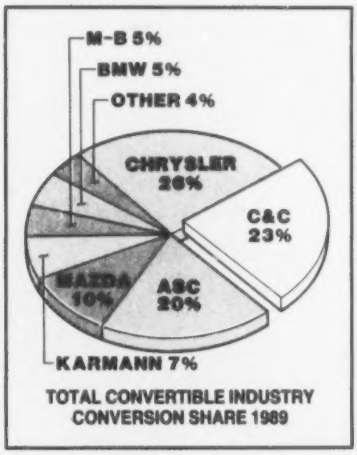
Topping Off

Since Chrysler began the ragtop renaissance in 1982 with its konvertible K-cars, the US droptop market has gone up like a roof in a rainstorm. Convertible sales have grown 438% since '82, according to Cars & Concepts, which performed the surgery on the first K's.

More than 176,000 softtops were sold in 1989 (roughly 1.7% of total US pass car sales), and C&C predicts **the 1990 market to hit 220,000 units**.

Since '82, C&C has de-topped nearly 180,000 Ford Mustangs, completing over 42,000 in '89 alone, making the Mustang an American convertible favorite and undoubtedly contributing to the car's lifespan.

New conversions of 1990-model Chevy Beretta and Olds Cutlass could increase total C&C output to 50,000 units this year. The Brighton, MI specialist assembler hopes to increase that figure to 70,000 units by 1992 by putting the scalpel to new models.



TOTAL CONVERTIBLE INDUSTRY CONVERSION SHARE 1989

Trail-Blazin'?

"With this product we're going straight for the four-door [Jeep] Cherokee," proclaims Harry Turner, product engineering manager for the **1991 Chevrolet S-10 Blazer four-door.** Built off of a stretched version of the two-door Blazer (the chassis has a 6.5 in. section added to it), the four-door variant offers 25% more cargo room in the rear and adds an impressive 15 in. to the three-person rear seating area. (At the press preview, we witnessed several burly six-footers easily accessing the rear seat.)

Available in both 2WD and 4WD configurations, standard features include independent suspension, Kelsey-Hayes four-wheel ABS, and C-P-C's 4.3 L EFI V6. Turner expects the build split to be 75%-25% in favor of the four-door model. He also predicts that more than 40% of the new Blazer's (see photo on p.47) buyers will be sport/truck first-timers. The Olds version of the sport/utility vehicle is the Bravada.

It's In The Bag!

Airbags have been roundly criticized for adding complexity and cost to cars, but maybe it's a two-way street. Informed sources at Ford indicate that the **cost of airbags may eventually become a "wash"** since they will enable engineers to safely remove "crush"—and therefore costs—from the front-ends of vehicles. Additionally, airbags could make possible the sale of smaller vehicles that were previously unable to meet occupant protection standards. So with the current trend toward lower emissions and higher CAFE, it appears airbags are in the right place at the right time.

Toyota Shops In The US

Toyota, in an effort to quiet its foreign critics, has embarked on a program to raise imports to Japan to at least $2.1 billion by 1992—more than **double 1989 projected levels**. Among the main items planned for 1992 importation include 40,000 right-hand drive cars and 100,000 engines per year from the company's Kentucky plant; catalytic converter substrates from wholly-owned subsidiary TABC (600,000 units in '90, 750,000 in '92); a seven-fold increase in semiconductors (Toyota is now importing 21,000 a month); Celica convertibles (1200 units in '91); and a $15 million Cray supercomputer.

Designer's Crash Course

In the 1990s the cost-of-ownership will play an increasing role in customer satisfaction, the experts say. And Tech-Cor, a subsidiary of Allstate Insurance, believes it has a tool the OEMs can use to keep costs lower. It's called the Collision Damage Index and it compares the relationship of repair costs to the retail value of a vehicle. Tech-Cor has developed a 15-page checklist that designers and engineers can use to **improve design to help limit damage in an accident.** "This benefits the consumer by holding costs down and by containing insurance rates," says Don Cameron, president of Tech-Cor. Call Jack Ribbens at 708-541-4545 for a copy of the checklist.

The design and manufacturing guys call it "the bottom line." Marketing mavens describe it as "the price of admission." Advertising uses it so much these days that they refer to it simply as "the Q word."

Quality is the automotive industry's most buzzed buzzword. Every vehicle-maker worth his warranty claims his products have it. Many pump slogans like "best built", "most trouble-free", and "highest quality" into their ad copy with almost reckless abandon, hoping they can embed the 'Q word' in carbuyers' brains before the term becomes too trite.

Thanks to intense competition in every market segment, quality is a rapidly moving target. Even econobox buyers want—*expect*—four-and-a-half mil gaps in the doors, a bulletproof, stumble-free drivetrain and controls that move with machine tool precision. Quality experts agree that customer expectations are increasingly defining automotive quality, as well as setting the standards for its execution.

In general, listening to the customer seems to be paying off. New car quality is higher industrywide, according to *Consumer Reports' Frequency of Repair Records* and the J.D. Power *Initial Quality Survey* (IQS)—the two most respected independent barometers that are biased more towards ex-factory quality than towards dealer performance. The *Consumer Reports Frequency of Repair* report, published in *CR* each April, is a model-by-model survey in which owners are asked to check one of 16 categories in areas where they have what they consider to be serious problems. In other words, car owners must think a problem is serious enough to check a box.

In *CR's* 1989 survey, which dealt with a universe of 562,000 cars between May '87 and April '88, average total maintenance and repair costs per model year actually declined (see chart) as they did in the previous year's survey. Robert Knoll, head of automotive testing at *CR*, says that looking over a five-year period, new car quality, on average, is better. He says that his data shows the average number of troubles per car is down across the board.

An '89 car, Knoll says, will have less

WINNING THE QUALITY WAR
Consumer Reports' Frequency-of-Repair Records, 1983-88

TROUBLE SPOTS	WHAT THEY COVER	% OF 'AVERAGE' CARS RECEIVING COMPLAINTS '83	'84	'85	'86	'87	'88
Air conditioning	Compressor, expans.valve, fans, leakage	16	11	9	5	4	2
Exterior paint	Fading, discoloring, chalking, peeling	11	9	6	5	4	2
Exterior rust	Pitting, corrosion, perforation	10	6	3	2	1	0.5
Body hardware	Window, door, seat mech.; locks, belts, head rest.	12	10	10	9	8	5
Body integrity	Air/water leaks; wind noise; rattles/squeaks	10	10	10	9	9	6
Brakes	Power boost/hydraulics; linings; discs/drums;malfunction	16	14	11	7	4	2
Clutch	Lining; pressure plate;release bearing;linkage	14	9	6	7	5	3
Driveline[1]	U-joints; axle; diff.; wheel bearings; prop shaft	4	4	3	2	2	1
Chassis electrical	Starter; alternator; batt.; wiring; instruments; lights; controls; radio; access. motors	18	16	16	13	10	5
Engine cooling	Radiator; heater core; water pump; overheat.	12	8	6	3	2	1
Engine mechanical	Rings; cylinders; pistons; bearings; valves, cam; oil leaks; turbo, overhaul	11	9	6	4	3	1
Exhaust system	Manifold; muffler, cat.converter; pipes; leaks	16	12	7	3	2	1
Fuel system	Stall./hesitat.; carburetion; computer; fuel inject.; fuel pump; emiss. controls; leaks	17	14	11	9	7	3
Ignition system	Plugs; coil; distributor; elect. ignition; chronic pinging; too-frequent tune ups	8	7	5	4	3	1
Suspension	Wheel alignment; springs; ball joints; bushings; shocks/struts	11	10	8	6	3	1
Transmission (man.)	Includes linkage and transaxle	5	3	3	3	3	2
Transmission (auto.)	Includes linkage and torque convert.	8	6	5	4	3	2
Cost Index	Average repair costs per model year	$300	$280	$240	$190	$110	[2]

[1]Except transmission. [2]Most '88 model repairs covered under warranty

Source: Consumer Reports, April 1989

troubles than an '88 in its first year. The important thing Knoll looks for is a pattern from one year to three years old, although he points out that the newest cars don't deviate much from average, because if the percentage of trouble is, for example, over 1%, then it's difficult for them to do much better than that.

How do American cars compare with Japanese cars in the *CR* survey? Knoll says they're getting a lot better.

"You can especially see it in the Body Exterior Rust and Engine Mechanical categories [which have improved for all cars]. The Japanese have really stayed about the same," he says, adding that he doesn't think the Japanese cars will improve as quickly in this area as they have in the past.

According to Knoll, the *CR Frequency of Repair* data shows that some cars get better with age – especially American cars like the Chevy Caprice and Ford Crown Victoria. Some, particularly the Europeans, get worse.

Knoll, a 24-year veteran of *CR*'s automotive test department, believes the longer customers own a vehicle from new, the less they seem to care about the 'perceived quality' items that are so important in the showroom – door thunk, body panel fit, etc. They begin putting up with a certain degree of IP squeak and deteriorating weatherstripping, in exchange for what he maintains is the real yardstick of automotive quality – daily reliability.

The J.D. Power IQS, conducted on both new car and truck owners, also serves as an early reading of how new-model vehicles are performing in customers' hands. The IQS is based on problems per 100 cars during the first 90 days of ownership.

For the 1989 IQS, Power sent out 65,000 surveys to new car owners and achieved a 38% (24,700) response rate, according to Bill Fleming, the J.D. Power and Associates research analyst who wrote the 1989 Initial Quality Survey (IQS). The latest data shows that overall, the industry's initial new car quality is clearly improving, averaging 153 problems/100 cars. That's an improvement of 21 problems/100 cars versus 1988.

Overall Japanese IQS performance, at an average of 119 problems/100 cars, also was up 21 problems/100 cars,

I think the whole of the industry has had too short a vision [on the depth of its product quality].

– Bob Marshall, executive director corporate quality, Ford Motor Co.

handily beating the Big Three's 163 problems/100 cars and the Europeans' 204/100. In the 1988-89 period, the domestics' initial quality improved by 14 problems/100 cars.

Power only publishes the top 10 IQS nameplates because "We like to use the carrot rather than the stick," explains Fleming. Listing the marques with the worst initial quality would not have a positive effect on the manufacturers, he says.

Just what is 'quality' as it applies to new vehicles today? According to two of the domestic industry's top quality guns, there are no standard answers. They say the definition of quality will always be elusive, as customer expectations continue to rise.

"I define it as 'exciting, dependable, trouble-free operation,'" says Ed Czapor, VP and group executive in charge of quality and reliability at GM. He stresses that the myriad of choices in the marketplace are responsible for raising the customer's expectations of quality.

"The customer is walking into the showroom and making a decision on paint finish today!," says Czapor. "The thing we're battling right now, that the whole domestic industry is battling, is perception versus reality."

In Czapor's view, American vehicle quality is really much better than it's perceived, whereas Japanese quality is good but is seen as being good. He says just getting people into vehicles is an important step for the domestic industry and is "something we've really got to work on."

Bob Marshall, Ford's executive director of corporate quality, says that as a process based on design, manufacturing and dealer performance, quality means "increasing Things Gone Right, more than reducing Things Gone Wrong."

This same philosophy has been a guiding tenet in Honda's design and manufacturing process. Shoichiro Irimajiri, former president of the Marysville operation and now a Honda managing director, once told *AI:* "If you succeed in reducing manufacturing defects from two in 100 to one in 100, you may be tempted to think you did a good job. But Mr. Honda would always remind us that the customer is only buying *one* product. If the customer gets that *one* bad product, for the customer 100% of the product will be bad."

Both domestic quality czars agree that customer perceptions of quality must drive automakers in setting their quality goals – something J.D. Power's Bill Fleming calls 'quality in the eye of the customer.' That means satisfying buyers' expectations of comfort, operation, performance, finish and reliability, coupled with fanatical customer care in the crucial 30-90 day period after purchase.

"Customer satisfaction is at its highest level when the guy gets his new car," notes Bob Marshall. "After that, it deteriorates. So at delivery, the car has to meet all of the customer's expectations. We still have a better job to do; we build a hell of a lot of cars and still hear complaints that distress us."

Where are the industry's major quality weaknesses? To GM's Czapor, they are still fit/finish and body assembly. *CR's* Knoll points to the electrical problems and driveability demons which continue to top most independent problem lists (as they've done on the *CR* roster for years), despite strides in systems design and hardware reliability. Ford's Marshall says aesthetic deterioration, especially materials aging, is 'everyone's problem.'

To measure quality, the automakers rely heavily on internal plant audits. GM, for example, has an audit called Customer Oriented Vehicle Evaluation – COVE. It is conducted at least once a month in each assembly plant, by trained auditors that work under Dick Roden, corporate director, quality and reliability. According to Roden, who runs GM's driveability and assembly plant audits, his team arrives at the plant completely unannounced, then selects 20 vehicles at random – 10 built the previous week and 10 built the current week.

The auditors conduct a fit and finish review, including underbody and underhood analyses, all under bright lights. They do a four minute water test. They look at image reflection in the paint, then drive the vehicles over a 10-mile course as a customer would.

Roden says that although no actual customers are present, his teams try to put as much customer input into the audit as possible. GM auditing standards are developed by running clinics, one of which is planned for early 1990 to determine levels of wind noise, which Roden says has been a source of GM customer complaints.

Most surveys show that powertrain quality – performance and reliability – is most important to customers. To this end, GM has taken a drive schedule that Roden says 91% of GM owners go through and has applied it at the Proving Grounds over a mileage test. They put the car in an overnight soak, then count how many seconds it takes to start the engine and whether the engine stalls or sags. Cold cycle traffic manuevers and a transmission evaluation are next, to cap a 10-mile cold/10 hot test program.

This audit is completed on five engine families, then on every combination of GM engines and transmissions. It's evaluated on a scale of 100, and reported monthly to corporate engineering by engine family. GM also runs a proving ground test that simulates 10 years of vehicle usage in a 12-month period, by running the vehicles around the clock. Czapor and Roden believe that's a major indicator of long-term reliability, although obviously an automaker can only put so many vehicles through such a test.

Manufacturers are now adjusting their internal auditing because of customer wants and expectations. Earlier audits were frequently based on safety-related quality concerns, and the conduits for customer feedback were often not open. Now, Quality

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What areas of quality still need improving? The OE quality bosses say it's fit/finish and materials aging. But driveability demons still haunt the industry.

Function Deployment (QFD; see Jan. '89 *AI*, p. 30) gives OE engineers customer input at the esign stage, drastically affecting initial quality.

"In the past there was often a difference between what an engineer thought was acceptable quality, and what the customer wanted in quality," says Ed Czapor. "Now we get the customer input right up front. Now the engineer has that information in his knowledge bank when he designs."

"The Voice of the Customer and the voice of the engineer aren't necessarily the same," adds Ford's Marshall. "Nearly two years ago we did some driveability correlations between how the customer sees driveability and how engineers evaluate it. Our engineers evaluated it somewhat differently."

He says engineers tend to get 'mentally corrupted' by what they think is practical or not. "If you start saying, 'To hell with what's practical – here's what the customer says is a problem,' they take a different attitude about spending money," Marshall says.

Both he and Czapor note relatively simple changes their engineering teams have made to improve decklid and door closing effort, to suit the customer's expectations of quality in this area. "QFD says that if you're going to be competitive in a certain price class, this is how your door should operate," Marshall states.

Automakers are interested in the traditional defects per vehicle and defects per 100 vehicles, because they can dial this data back into design and manufacturing. But J.D. Power's Fleming maintains that since buyers want something that will keep them satisfied over time, a vehicle can actually have a manageable number of defects from the factory, *as long as they're fixed quickly.*

In other words, there is not always a direct correlation between quality, both initial and long-term, and customer satisfaction/loyalty. This is particularly evident in the upper strata of the import luxury segment. Product uniqueness, image, performance, and how the dealer strokes the customer all play a role in the owner's perception and expectations of quality.

INITIAL QUALITY 1989
The Top 10 Models

1.	Nissan Maxima
2.	(tie) Buick LeSabre, Toyota Corolla
4.	Ford Crown Victoria
5.	Mercedes-Benz S-class
6.	Mercury Tracer
7.	Toyota Cressida
8.	(tie) Subaru Loyale sedan, Subaru Loyale coupe
10.	(tie) Buick Riviera, Mercedes-Benz 190 E/D

Source: J.D. Power and Assoc.

INITIAL QUALITY 1989
The Top 10 Marques

	reported problems per 100 cars
Mercedes-Benz	103
Porsche	106
Nissan	111
Honda	111
Toyota	117
Acura	120
Buick	121
Mazda	133
Mercury	134
Daihatsu	140
INDUSTRY AVERAGE	153

Source: J.D. Power and Assoc.

"People that buy in the upper market segments are usually well-educated," says Fleming. "They know about a certain marque's problems, and realize, in some cases, they'll be buying those problems to a certain extent."

George Parker, associate administrator for enforcement and director of vehicle safety compliance at NHTSA, agrees. Although his agency only maintains a database on safety-related complaints (including driveability), each year it receives some 20,000 quality-related complaints of all types. "For some reason, people that own luxury cars don't complain," comments Parker.

Is this a result of vehicle cost? Both Power's Fleming and *CR*'s Robert Knoll say that some owners may be reluctant to come clean about their new $60,000 Bahnpanzer's problems because it might reflect on their prowess as a car buyer. But the other side of the coin holds just as true: the more money spent on a vehicle, the better the product is expected to be and the more willing the buyer is to tell the truth about it.

Even in the market's proletarian segments, there are plenty of examples of cars with spotty initial quality enjoying great sales success. For example, both Fleming and Knoll agree that in the Taurus's first 18 months of production, the car's fresh styling and new image offset many early problems that may have sunk other cars.

"In the Taurus' case, Ford did a great job in promoting the car. They really played up the 'Quality is Job 1' in the ads," notes Fleming, who adds that automakers can heighten the expectations of new car owners too much. He says that all manufacturers run a risk of letting their marketing and advertising get out ahead of a vehicle's actual initial quality performance in the marketplace. Each new vehicle, after all, has to prove itself: That the popular press pounced on Lexus after their LS400 recall is a lesson here.

Ford's success with Taurus was that in the early days, they had enough Things Gone Right that it simply

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The thing the whole domestic industry is battling right now, is the perception [of quality] versus the reality.

—Edward Czapor, VP of quality and reliability, GM

swamped the Things Gone Wrong—it was a very customer-driven car in its design and content. However, quality boss Marshall says Ford will never again launch a car at a quality level that was less than the prior model's, as they did with Taurus. He admits that the project's many 'entrepreneurial' late changes (the old moving target again) and lack of discipline in some areas of the process helped cause initial quality problems. Marshall says lessons learned from Taurus initial quality has helped Ford launch a better Town Car.

To even better assess new vehicle quality, why not look beyond 60-90 day initial ownership reports and 15-month surveys? J.D. Power's Bill Fleming indicates that his company is working on a study that examines much longer ownership periods. Ford's Bob Marshall believes that on vehicle quality, "the whole of the industry, Ford included, has had too short a vision." Ford, which does 12-month surveys, has now gone out to six years. And in some areas, like corrosion, they're starting to look at 10-year old vehicles.

"We started doing trim surveys about three years ago," Marshall notes. "Now we do them at the same time we do corrosion surveys, and we see deterioration in places like Florida where the headliner's come down."

According to Marshall, as a result of these surveys, Ford has upgraded all of its trim specifications, driving plastics and trim suppliers from the survey results. "We've quadrupled our requirements for fading of interior cloths," he says. "Our objective, as a company, is to have the best satisfaction level at the time the customer trades his vehicle in. And I can tell you, we're obviously not there."

If average trade-in periods vary from about 32 months to five years, why should an automaker care about quality beyond that? Ed Czapor says GM targets 10 years as the useful life of its vehicles. He cites used car values as one reason to improve long-term quality—they make a big difference in whether the owner can trade or not. Reliability is a big factor in price, so price/value is very important. And people are keeping their vehicles longer and trading less frequently.

Bob Marshall says that if Ford's current 90% initial owner satisfaction levels were to sink to 50% after four years, few would buy another Ford. "If you could somehow keep that up to 80% after four years, you're going to conquest your competition," he notes. "If people are happy with their car over an extended period, they form an affection for the car and an affection for the company. And that gives you a hell of an edge on the loyalty."

What it all boils down to is that perfect vehicle quality is a long way off. There will always be a range of quality between companies, even if that range narrows to a razor's edge. There will be quality gaps between an individual maker's models, and even between different models built on the same platform. The key to improving quality is improving the connection between customer and designer, customer and engineer, customer and planner.

The fewer unplanned trips back to the dealer, the better the customer feels about the product. And if you can take care of that customer in that critical 30 to 90 days, you're going to have a happy customer. AI

COMPLAINTMOBILES
NHTSA's Top 10, 1987-88*

	CAR	1987-'88 SALES	TYPICAL COMPLAINTS	COMPLAINTS per 10,000 CARS
1.	Oldsmobile Delta 88	327,058	Driveability, brakes	10.5
2.	Plymouth Horizon	107,602	Driveability, electronic ignition	10.1
3.	Acura Legend	125,483	Surging at idle	10.0
4.	Pontiac Bonneville	210,364	Driveability	9.8
5.	Buick LeSabre	282,566	Driveability, brakes	9.7
6.	Oldsmobile 98	145,349	Driveability	6.7
7.	Mercury Sable	223,736	Driveability, brakes	6.6
8.	Nissan Maxima	167,720	Surging, transmiss., steering, tires	5.5
9.	Mazda 626	140,793	Transmission, suspension	5.4
10.	Ford Tempo	504,473	Driveability	5.2

*Based on sales of over 100,000 units each. 'Driveability': combination of surging/stalling